THE OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING FOR RESEARCH AND TECHNOLOGY

NEWSLETTER

JUL-AUG 2021

INNOVATING TODAY TO PROTECT OUR FUTURE

INSIDE THIS ISSUE:

FEATURED

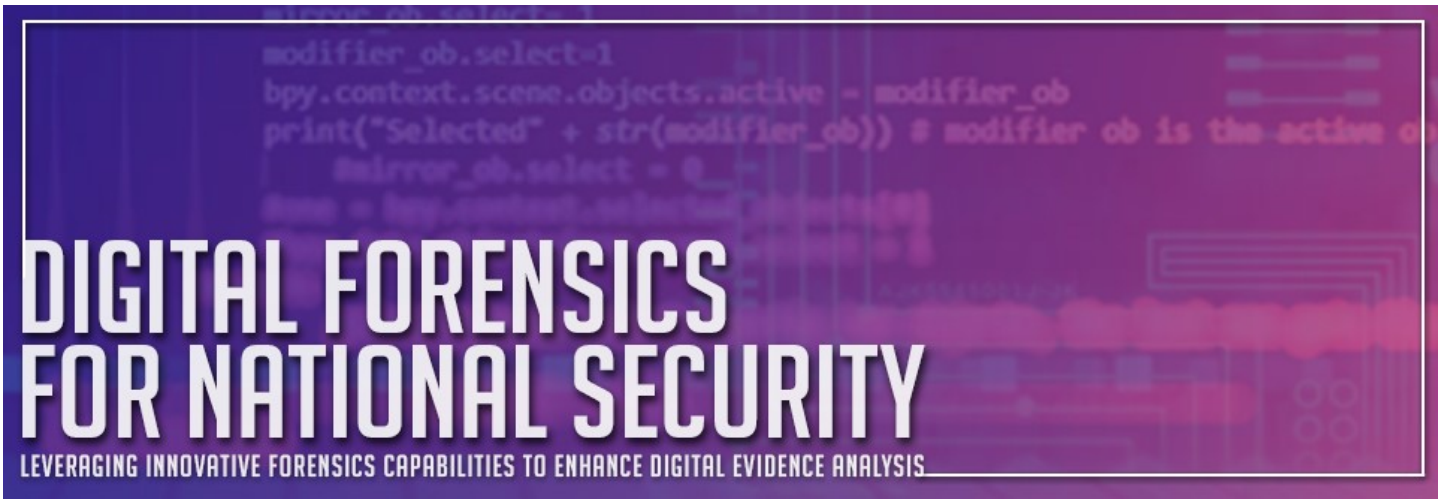
DoD Maintaining Technology Advantage Efforts at Digital Forensics Symposium

Vannevar Bush Fellows Achieve a New Milestone in Quantum Computing

MxD and Partners Cut the Ribbon on New Process Manufacturing Testbed

FEATURED UPDATES

STP&E Deputy Director Shares DoD Maintaining Technology Advantage Efforts at Digital Forensics Symposium

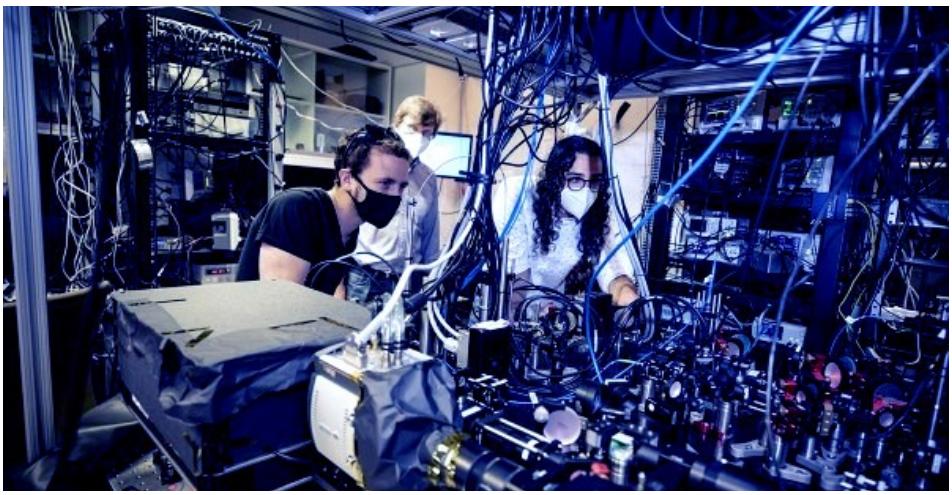


On July 8, 2021, Strategic Technology Protection and Exploitation (STP&E) Deputy Director Dr. Robert Irie provided remarks at the Defense Strategies Institute Digital Forensics for National Security Symposium in National Harbor, Maryland. His keynote addressed DoD's efforts to maintain technology advantage by mitigating vulnerabilities and exploiting those critical missions and technologies of determined adversaries. He explained how STP&E's Damage Assessment Management Office (DAMO) and Joint Acquisition Protection and Exploitation Cell (JAPEC) provide analysis that enables protection efforts across the DoD enterprise to mitigate technology losses and capitalize on additional protection opportunities. He shared how STP&E and DoD collaborate with both counterintelligence and law enforcement as part of a whole-of-government approach to manage adversarial exploitation risks. For more information on these STP&E capabilities and collaboration opportunities across OUSD(R&E), please contact at osd.pentagon.ousd-r-e.mbx.rt-capa@mail.mil

Dr. Robert Irie

The Deputy Director for Strategic Technology Protection and Exploitation (STP&E)

Vannevar Bush Fellows Mikhail Lukin and Markus Greiner Achieve a New Milestone in Quantum Computing

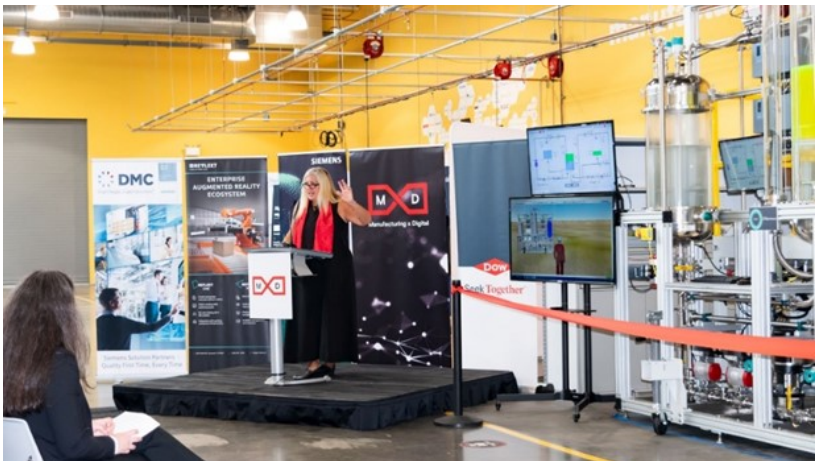


Vannevar Bush Faculty Fellows Mikhail Lukin (class of 2015) and Markus Greiner (class of 2018)

.

Vannevar Bush Faculty Fellows Mikhail Lukin (class of 2015) and Markus Greiner (class of 2018) have successfully developed a new, one-of-a-kind quantum computer, also known as a programmable quantum simulator, with a capacity of 256 quantum bits (qubits). This provides a computing power that is exponentially larger than the best traditional supercomputers. In a paper published in Nature, Lukin and Greiner, along with several co-investigators, demonstrated the quantum simulator operation by preparing two-dimensional arrays of neutral atoms, with strong interactions controlled by coherent atomic excitation into Rydberg states. Using this approach, they realized a quantum spin model with tunable interactions for system sizes ranging from 64 to 256 qubits. They benchmarked the system by high-fidelity characterization of anti-ferromagnetic (AF) ordered states and demonstrated quantum critical dynamics consistent with an Ising quantum phase transition in two dimensions. They created and studied several new quantum phases that arise from the interplay between interactions and coherent laser excitation, experimentally mapped the phase diagram and investigated the role of quantum fluctuations. By offering a new lens into the study of complex quantum matter, these observations pave the way for investigations of exotic quantum phases, non-equilibrium entanglement dynamics and hardware-efficient realization of quantum algorithms. Please find the full article here: https://www.nature.com/articles/s41586-021-03582-4.

MxD and Partners Cut the Ribbon on New Process Manufacturing Testbed



Chandra Brown, MxD CEO; Photo credit: MxD

MxD; Pictured left to right: Laura Coates, Vice President and General Manager, Process Automation, Siemens; Chandra Brown, CEO, MxD; Billy Bardin, Global Digitalization Director, Dow; Raj Batra, President of Digital Industries for Siemens, USA; Del Costy Senior Vice President & Managing Director, Siemens Digital Industries Software

MxD, the Digital DoD MII, is hosting a new test bed at the MxD Future Factory located in Chicago, Illinois that offers a hands-on demonstration of how innovative software and Internet of Things (IoT) come together with hardware to accelerate digitalization for the process industries. MxD, along with institute members Siemens and Dow and Siemens' integrator partner, DMC, collectively bring transformative workforce benefits to the process industries at a time when companies are accelerating their digitalization plans, and remote accessibility is becoming more of a staple with the ongoing COVID-19 pandemic. Digitalizing the process industries today can help create a safer work environment for plant workers and better products for their customers.

The test bed will allow companies to see firsthand how to design, monitor, and maintain their products more effectively, efficiently and even remotely, using data and digital tools.

The project will wrap up over the next couple of months. The testbed will then be open to MxD members and future projects for testing and experimenting with various digital twin or process manufacturing use cases relating to predictive maintenance, cybersecurity, simulation of dynamic chemical processes, and beyond. To read more, visit: https://www.mxdusa.org/2021/07/28/siemens-dow-and-mxd-partner-to-enhance-digitalization-in-the-process-industries-with-process-automation-test-bed/.

Resilient Systems Directorate Announces New Release of Cyber Resilient Weapon Systems Body of Knowledge Portal

ENGINEERING CYBER RESILIENT WEAPON SYSTEMS CRWS-BOK

The Resilient Systems (RS) directorate launched Version 1.1 of the Cyber Resilient Weapon Systems Body of Knowledge (CRWS-BoK) Portal in July 2021. The initial version launched May 2021. The CRWS-BoK Portal provides a comprehensive repository of authoritative guidance and knowledge for science and technology (S&T) professionals from DoD, industry, and academia who specialize in cyber resilient weapon systems. Users will be able access, search, annotate, save, and share the engineering information they need to develop and maintain secure CRWS programs. The updates in Version 1.1 include enhancements to the portal views and interface, optimized relationship resource graphs, and new references tables from the details view. The RS directorate, under the leadership of Director Melinda Reed, designed and developed the CRWS-BoK Portal. RS will continually update this portal with curated guidance so that it remains a living, informative resource. For additional information and to register for a free account, please visit the CRWS-BoK Portal at https://crws-bok.org.

Image Sourced from iStock

Resilient Systems Collaborates with Federal Partners on Cybersecurity Executive Order

In May 2021, President Biden signed Executive Order (EO) 14028, "Improving the Nation's Cybersecurity," to improve the Federal Government's to "identify, deter, protect against, detect, and respond" to increasingly malicious cyberattacks. In July 2021, STP&E's RS directorate volunteered to serve as the office of primary responsibility for Section 4(n) of this EO. This section directs various federal entities, including DoD, Department of Homeland Security (DHS), and the Office of Management and Budget Director to recommend contract language requiring adoption of security standards for critical software to the Federal Acquisition Regulation Council. RS continues to meet with DoD's Chief Information Officer, the Office of the Under Secretary of Defense for Acquisition and Sustainment, and DHS to discuss requirements and responsibilities in response to the order.

RS Leads DoD Technical Exchange Meeting to Integrate Cyber Mission Force Operational Requirements

RS led a Technical Exchange Meeting with DoD stakeholders on Cyber Mission Forces – Weapon System Technical Requirement Dependencies with the purpose of examining the process for planning and integrating Cyber Mission Force operational requirements into the systems engineering process of weapon systems. Discussion included insights into how Cyber Mission Forces operational requirements are captured; how evaluation criteria is defined; and how requirements flowed down into the weapons systems design and test. Participants included representatives from U.S. Cyber Command, Joint Staff 6, Developmental Test, Evaluation, & Assessments, Joint Strike Fighter Program Management Office, Army, Air Force, Deputy Assistant Secretary of the Navy for Research Development Test and Evaluation, Office of the Deputy Chief of Naval Operations for Information Warfare, and Mission Integration. Discussion topics included cyber survivability requirements, mission and system operational requirements, operational users, and weapon system requirements dependency, test of the system and the Mission Integration study on Offensive Cyber Operations. RS will continue to engage stakeholders to collaborate on areas that can improve methods to integrate capability into the system design.

Maintaining Technology Advantage Directorate Welcomes New Directors

STP&E recently welcomed its new permanent Director for the Maintaining Technology Advantage (MTA) directorate, Dr. Jessica "Jesse" Appler. Dr. Appler joins MTA with extensive acquisition cycle experience. Previously, she served as a Science and Technology (S&T) Advisor to the Assistant Secretary for Preparedness and Response (ASPR) in the Department of Health and Human Services (HHS). Most recently, she was the HHS lead for intra- and interagency technology protection supporting medical countermeasure development during the COVID-19 response. MTA also recently welcomed Dr. Patrick Lee, the new S&T Exploitation and Analytics Director. Dr. Lee is responsible for developing data-driven models and analytical assessment capabilities to proactively identify and prioritize exploitation and protection opportunities to maintain technological advantage, including across R&E technology modernization priorities. Dr. Lee is a former Department of Commerce computer engineer and has also previously worked in both industry and academia.

Maintaining Technology Advantage Represents STP&E at Third National Science, Technology, and Security Roundtable

Dr. Jesse Appler
MTA Director

Dr. Patrick Lee
S&T Exploitation and Analytics Director

STP&E and its MTA directorate continue their robust involvement with the White House National Science and Technology Council. In July 2021, STP&E represented DoD at the NSTC National Security Science and Technology Strategy (NSSATS) meeting. The Council discussed potential revisions to the critical technology areas list in the National Critical and Emerging Technologies Strategy. In August 2021, MTA participated in NSTC Research Security Subcommittee discussions on implementing National Security Presidential Memorandum (NSPM) 33. NSPM 33 focuses on strengthening protections of U.S. Government-supported research and development against foreign government interference and exploitation. The Research Security subcommittee continues to address topics essential to NSPM 33 information implementation, including sharing processes, external messaging, and disclosure requirements.

Technology and Manufacturing Industrial Base Leaders Promote Latest DoD Additive Manufacturing Efforts

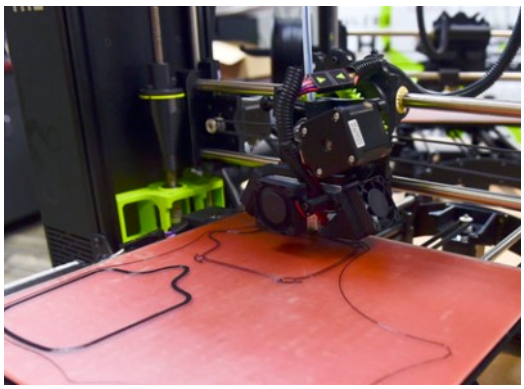


Photo By: Navy Petty Officer 2nd Class Michael Lopez

On July 27, 2021, Mr. Rob Gold, Technology and Manufacturing Industrial Base (TMIB) Director, spoke at the Defense Strategies Institute's 5th Annual Military Manufacturing Summit in Tampa, Florida. He discussed how DoD is executing the Additive Manufacturing (AM) Strategy, aligning activities through the Joint Additive Manufacturing Working Group, and expanding AM proficiency through both public and private partnerships. Mr. Gold and Manufacturing Technology Director Ms. Tracy Frost also conducted an interview with Defense.gov in July on how DoD is harnessing AM potential through new strategies, policies, and inter-departmental collaboration. To read the interview, please visit https://www.defense.gov/Explore/News/Article/Article/2712969/dod-promotes-additive-manufacturing-expansion-standardization-training-through/.

TMIB Directorate Meets with White House to Advance American Manufacturing

TMIB Director Mr. Rob Gold and other TMIB personnel met with Ms. Elisabeth Reynolds, Special Assistant to the President for Manufacturing and Economic Development, in July 2021 to discuss the Biden Administration's goals and objectives for American manufacturing. TMIB provided context for DoD's role and authorities in manufacturing and industrial base policies across the interagency, joint, and public-private partnership environment. The Administration is eager to develop national strategies to thwart supply chain disruptions, promote scale-up and commercialization, strengthen small and medium-size manufacturers, advance education and workforce development (EWD), create long-term domestic manufacturing technology strategies, and leverage DoD Manufacturing Innovation Institutes. TIMB will collaborate with the White House to help develop a priorities list and possible strategy as part of an interagency team by December 2021. TMIB will also explore ways to energize the White House Office of Science and Technology Policy' s Subcommittee on Advanced Manufacturing.
https://whiteboardadvisors.zoom.us/webinar/register/5116227289639/WN_bv0snW7DQda0PichOfXWww.

Robotic Technology Demonstrated for Autonomous Aircraft Coating, a Key Priority for DoD Sustainment Centers

DoD Manufacturing Innovation Institute (MII) Advanced Robotics for Manufacturing (ARM) worked with member organizations Lockheed Martin Corporation, Aerobotix, and Southwest Research Institute (SwRI) to demonstrate the use of robots to automate the application of advanced coatings. This is a high priority project for the sustainment community as identified by ARM's partnership with the DoD Joint Robotics Organization for Building Organic Technologies (JROBOT) Group.

The Mobile Autonomous Coating Application System for Sustainment project encompasses key robotic capabilities that resolve several of the critical needs towards achieving autonomous mobile multi-agent robotic spray systems that are capable of painting large, complex aircraft.

The project team was able to demonstrate the program's results to more than 75 individuals representing over 20 organizations during the final out-brief and live demonstration. Broad DoD participation included: Air Force Research Laboratory Manufacturing Technology, Warner Robins Air Logistics Complex, Ogden Air Logistics Complex (F-22), Hill Air Force Base, Naval Undersea Warfare Center, Office of Naval Research, and U.S. Marine Corps Logistics Command. For detailed information about this project, including a demonstration video, please visit https://arminstitute.org/project-highlight-mobile-autonomous-coating-application-for-aircraft-sustainment/.

AIM Preparing to Host Final Update for CARES Act Project: Disposable Photonics for Biomedical Assays Are Basis for Rapid, Compact, Microfluid COVID-19 Test

Rapid detection of COVID-19 will remain a critical capability into the fall/winter as other viruses are also prevalent, and tests to identify associated antibodies will be important for assessing vaccine performance as more mutations arise.

The AIM Photonics MII developed a new process and carried out a successful demonstration of a "disposable photonics" approach to COVID antibody detection, as well as an assay on the platform allowing monitoring of SARS-CoV-2 spike protein after vaccination. The system has been transferred for commercial evaluation, with the second generation nearing completion. Read more about this technology, "Disposable photonics for cost-effective clinical bioassays: application to COVID-19 antibody testing - Lab on a Chip (RSC Publishing)", https://pubs.rsc.org/en/content/articlelanding/2021/lc/d1lc00369k.

Photo credit: ARM Institute

DoD Welcomes Future Members of the Science and Engineering Workforce

SMART
SCIENCE, MATHEMATICS, AND RESEARCH FOR TRANSFORMATION
PART OF THE NATIONAL DEFENSE EDUCATION PROGRAM

The DoD, through the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)), welcomed 416 new scholars into the 2021 Science, Mathematics, and Research for Transformation (SMART) Cohort on August 1, 2021. SMART scholars pursue undergraduate and graduate degrees in one of 21 STEM disciplines aligned to the Department's modernization priorities and other areas of technical importance. Upon graduation, scholars of the 2021 cohort will fulfill an employment obligation to the Department at one of 101 selecting DoD laboratories or agencies. The 2021 cohort is comprised of students representing 184 colleges and universities, nearly half of which are Historically Black Colleges and Universities/ Minority Institutions, Tribal Colleges and Universities, minority-serving institution. The 2021 cohort is both the largest and most diverse (with respect to ethnicity, race, and gender) in the program's 15-year history. The SMART Program are currently accepting applications for the 2022 SMART Cohort until December 1 at 5:00 PM EST. For more information, visit https://www.smartscholarship.org/smart.

2021 Science, Mathematics, and Research for Transformation (SMART) Symposium

The DoD SMART Program, managed under OUSD (R&E), hosted its fourth annual symposium on July 13 -15, 2021. A highly competitive scholarship-for-service program focused on science, technology, engineering, and mathematics (STEM), SMART is one of the largest STEM education and workforce initiatives effort under DoD STEM. DoD STEM is the Department's comprehensive K-20 STEM education and talent development effort, which inspires, cultivates, and develops talent to address the Nation's technological challenges, now and into the future. SMART is empowered to make full-tuition awards during any phase of a scholar's education in a regionally accredited U.S. university or college. The program sponsors undergraduate, graduate, and doctoral study in 21 academic disciplines that the Department has identified as critical to national security and DoD's future. Since its inception in 2006, the program has awarded over 3,000 scholarships. This year's three-day virtual symposium entitled "Creating Leaders of the Future" consisted of keynote speeches by DoD leadership, a science communication workshop for SMART scholars, lightning talk presentations by 13 nominated SMART scholars representing each DoD Component, presentations by Junior Science and Humanities Symposia national oral presentation winners, and an inspiring presentation by the SMART leadership team of Ms. Karrin Felton and Dr. Brandon Cochenour. Among the DoD speakers who kicked off each day of the event were Ms. Barbara McQuiston, then performing the duties of the Deputy Undersecretary at OUSD(R&E), and Dr. Kevin T. Geiss, Director of Science and Technology at OUSD(R&E). To access the symposium recording, visit https://www.youtube.com/watch?v=19Wf7o6ZhLg&list=PLLUAc7CtRuXYnlJkkH4vS5xkvTSIoCCoO/.

DOD INNOVATORS SPOTLIGHT SERIES

DoD Innovators Spotlight Series—awardees across the Defense Enterprise share their cutting-edge work and best practices

The Office of the Deputy Director of Defense Research and Engineering for Research and Technology hosted a webinar with featured award winners: Dr. John Bennewitz, Principal Investigator, Rotating Detonation Rocket Engine Program at the Air Force Research Laboratory (AFRL), and Mr. Tim Miedzinski, Engineering Team Lead, Mechanical Instrumentation Branch at the Naval Air Warfare Center Aircraft Division (NAWCD). Dr. Bennewitz was awarded the Laboratory Scientist of the Quarter, which recognizes extraordinary service by DoD scientists and engineers that demonstrate exceptional work on behalf of the DoD; and, Mr. Miedzinski received the STEM Advocate of the Quarter, which recognizes outstanding STEM education and outreach efforts that further the mission of DoD. Both awardees presented on the innovative work and best practices they have been recognized for by the Department. The next DoD Innovators Spotlight Series event is scheduled for September 21, 2021, featuring 2020 George Linsteadt Award winner, the National Security Agency Technology Transfer Program team. For more information about the Spotlight Series, to view previous recordings and to register, visit https://dodstem.us/meet/innovators/.

Laboratory Scientist
of the Quarter

Dr. John Bennewitz
Principal Investigator,
Rotating Detonation Rocket Engine Program,
Air Force Research Laboratory (AFRL)

STEM Advocate
of the Quarter

Mr. Tim Miedzinski
Engineering Team Lead,
Mechanical Instrumentation Branch,
Naval Air Warfare Center Aircraft Division (NAWCD)

SCIENCE & TECHNOLOGY

Basic Research Office Convenes Virtual MURI Program Review

The Basic Research Office (BRO) hosted its annual OSD Multidisciplinary University Research Initiative (MURI) Program Review held virtually on July 14-15, 2021. This year's review addressed all 24 MURI efforts that resulted from the FY2019 MURI funding opportunity announcement (FOA). Each MURI principal investigator provided a 15-minute overview, which addressed scientific objective, technical approach, accomplishments, team members and collaborations, and challenges. The review serves as an opportunity for performers to identify collaboration and transition partners for their programs. This annual review helps BRO to better understand the current MURI program, to formulate guidance for future MURI programs and future reviews, and to engage with the MURI performers to discuss challenges and transition opportunities.

NDSEG Fellowship Program 2018 Class Conference

The National Defense Science and Engineering Graduate (NDSEG) Fellowship Program hosted its 2018 Class Conference virtually on July 19-21, 2021. The NDSEG 2018 Class Conference provided an opportunity for the Department to recognize the technical accomplishments of its 69 scholars from the 2018 class of award recipients, while also allowing those scholars to share their research with their peers and expose them to the broader research ecosystem at the DoD. The conference began with introductory remarks from Dr. Bindu Nair, and each day included remarks from Air Force, Space Force, Navy, or Army Research Laboratories, a career fair, and research talks and poster presentations by fellows. Special events included sponsoring agency breakout sessions, panels on the Tri-Services, diversity and inclusion, social media, and federally-funded research and development centers (FFRDCs) and university-affiliated research centers (UARCs), a former fellows networking lounge, and a talk by Mark Harkins (Georgetown University) on how fellows can engage productively with Congress. For more information, please visit https://ndseg.sysplus.com/.

HDIAC and STP&E coordinate webinar on DoD's role in CFIUS

Image Sourced from iStock

The Homeland Defense and Security Information Analysis Center (HDIAC) hosted a webinar on July 14 about the Department of Defense's work as a member of the Committee on Foreign Investment in the United States (CFIUS).
Initially created through a 1975 executive order then codified in statute, most recently updated with the passage of the Foreign Investment Risk Review Modernization Act (FIRRMA) of 2018, CFIUS is an interagency committee chaired by the U.S. Department of the Treasury that reviews certain foreign acquisitions, mergers, or takeovers of U.S. businesses to determine the effect of the transaction on national security.

The webinar highlighted DoD's role in this process, which is led by the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) as DoD's representative to CFIUS with support throughout the Department including the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)). As a stakeholder in CFIUS, DoD looks at prospective foreign investments in key areas to address potential technology transfer concerns and

maintain U.S. technological advantage. CFIUS protects U.S. interests by reviewing financial transactions, human resource exploitation, and cyber system vulnerabilities. Of particular interest to the DoD, CFIUS protects the defense industrial base, academic research institutions, and financial interests.

More than 50 of HDIAC's members engaged with presenters Ike Blanton, Deputy Director, International and Strategic Engagement, DoD Office of Foreign Investment Review and Lirio Avilés, Director, Technology Industrial Base Protection and Promotion, DoD office of Technology and Manufacturing Industrial Base within the Office of Strategic Technology Protection and Exploitation (STP&E).

Blanton and Avilés overviewed CFIUS's mission, structure, jurisdiction and FIRRMA updates, foreign investment trends, and DoD's case review process. A recording of the webinar is available to view at https://youtu.be/g-QktFlhTDM.
HDIAC is one of three DoD Information Analysis Centers managed by the Defense Technical Information Center (DTIC). HDIAC is chartered to leverage expertise from government, industry, and academia to provide scientific and technical analysis and information products in eight technical focus areas. For more information about HDIAC, please visit https://www.hdiac.org/.

DoD Research Data Working Group kicks off first meeting

The Department of Defense's Research Data Working Group (RDWG) hosted its inaugural meeting July 28, 2021. Led by the Defense Technical Information Center, the RDWG advocates for the unique needs and interests of DoD's scientific community, and acts as an advisory body to the DoD Chief Data Officer Data Council. Through collaboration with key DoD and federal government members, the RDWG will establish enterprise guidance to ensure open access, interoperability, and reuse of research data. DoD and other federal government CAC- and PIV-holders can learn more about the RDWG at https://go.usa.gov/xFtz3.

THE OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING FOR RESEARCH AND TECHNOLOGY

PROVIDING SCIENCE AND TECHNOLOGY LEADERSHIP THROUGHOUT DOD TO MEET THE CHALLENGES OF TODAY AND TOMORROW

USD(R&E)

Office of the Under Secretary of Defense,
Research and Engineering (USD(R&E))
The Pentagon, Washington, DC 20301

CONTACT US

DDRE(R&T) Staff at:
osd.pentagon.ousd-r-e.mbx.rt-capa@mail.mil
https://www.rt.cto.mil

@DoDCTO on Twitter